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PROBLEMS FOR SOLUTION.

ALGEBRA.

119. Proposed by **HARRY S. VANDIVER**, Bala, Montgomery Co., Pa.

$$\text{Given } \tan x = x + \frac{x^3}{3} + \frac{2x^5}{3 \times 5} + \frac{17x^7}{3^2 \times 5 \times 7} + \frac{62x^9}{3^2 \times 5 \times 7 \times 9} \dots$$

Find the general term and interval of convergence of this series.

120. Proposed by **JOSIAH H. DRUMMOND**, LL. D., Portland, Me.

A hollow sphere has within it a solid sphere; a quantity of water equal to $1/m$ of the capacity of the hollow sphere is poured in and just covers the solid sphere. Prove that there are two solid spheres, either of which answers the conditions; also find the maximum value $1/m$, beyond which the question is not possible.

*** Solutions of these problems should be sent to J. M. Colaw not later than July 10.

CALCULUS.

111. Proposed by **G. B. M. ZERR**, A.M., Ph.D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

(a). Find the dimensions of a cup, capacity c , in the form of a frustum of a pyramid regular, of n faces, so that its internal surface is a minimum.

(b). Find the dimensions of a cup, capacity c , in the form of a frustum of a hyperboloid or of a paraboloid, whichever it is, so that its internal surface is a minimum.

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MISCELLANEOUS.

91. Proposed by **ARTEMAS MARTIN**, LL. D., U. S. Coast and Geodetic Survey Office, Washington, D. C.

The following sides and area are given for a rational triangle in the table of rational scalene triangles on page 167 of Dr. Halsted's "Metrical Geometry" (Boston, 1881), viz.: sides, 21, 61, 65; area, 420. The same sides and area are given in Septimus Tebay's "Mensuration" (London and Cambridge, 1868), in a table on page 113.

The sides of this triangle can not all be correct because they are all *odd*.

Assuming that the *area* given is correct, it is required to determine the error in the sides.

92. Proposed by **J. T. COLE**, Columbus, Ohio.

A staff $a=60$ feet high, casting a shadow on a horizontal plane due north $b=20$ feet long, falls due northeast. Find the area covered by the shadow.

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